CLAIMS

1-8. (Cancelled)

9. (Withdrawn from Consideration) A substrate processing apparatus comprising:

a spin chuck adapted to hold and rotate a substrate;

a motor adapted to drive the spin chuck for rotation;

a chemical liquid nozzle adapted to supply a chemical liquid onto the substrate held by the spin chuck;

a rinse liquid nozzle adapted to supply a rinse liquid onto the substrate held by the spin chuck;

a nozzle moving mechanism adapted to move the chemical liquid nozzle and the rinse liquid nozzle relative to the substrate held by the spin chuck;

a chemical liquid control valve adapted to control a supply of the chemical liquid to the chemical liquid nozzle;

a rinse liquid control valve adapted to control a supply of the rinse liquid to the rinse liquid nozzle; and a controller that controls the motor, the chemical liquid control valve, the rinse liquid control valve and the nozzle moving mechanism according to a predetermined sequence of operations, the operations including:

(i) moving the nozzles, by operating the nozzle moving mechanism, from a first position above a periphery of the substrate toward a second position above a center of the substrate in such a manner that the rinse liquid nozzle follows the chemical liquid nozzle, while rotating the substrate held by the spin chuck by operating the motor, and while supplying the chemical liquid from the chemical liquid nozzle by operating the chemical liquid control valve, and supplying the rinse liquid from the rinse liquid nozzle by operating the rinse liquid control valve; and

(ii) stopping supplying the chemical liquid from the chemical liquid nozzle by operating the chemical liquid control valve when the chemical liquid nozzle reaches the second position above the center of the substrate, while continuing rotating the substrate, and continuing supplying the rinse liquid from the rinse liquid nozzle positioned above the center of the substrate.

10. (Withdrawn from Consideration) The apparatus according to claim 9, wherein, in the operation (ii), a rinse liquid supply rate is increased by adjusting an opening of the rinse liquid control valve.

11. (Withdrawn from Consideration) The apparatus according to claim 9, wherein the nozzle moving mechanism includes a nozzle arm, to which both the chemical liquid nozzle and the rinse liquid nozzle are mounted in such a manner that the rinse liquid nozzle is located outside the chemical liquid nozzle with respect to a radial direction of the substrate when the nozzles are located above the substrate held by the spin chuck.

12. (Withdrawn from Consideration) The apparatus according to claim 9, wherein the nozzle moving mechanism includes a pair of nozzle arms, to which the chemical liquid nozzle and the rinse liquid nozzle are mounted, respectively.

13. (Withdrawn from Consideration) The apparatus according to claim 12, wherein the controller is configured to control the nozzle moving mechanism in the operation (ii) so that a distance between the chemical liquid nozzle and the rinse liquid nozzle is maintained within a range ensuring that the rinse liquid is mixed with the chemical liquid spreading radially outward in a form of a film before the film breaks into droplets.

14. (Withdrawn from Consideration) A substrate processing apparatus comprising:

a spin chuck adapted to hold and rotate a substrate;

a motor adapted to drive the spin chuck for rotation;

a chemical liquid nozzle adapted to supply a chemical liquid onto the substrate held by the spin chuck;

a rinse liquid nozzle adapted to supply a rinse liquid onto the substrate held by the spin chuck; a nozzle moving mechanism adapted to move the chemical liquid nozzle and the rinse liquid nozzle relative to the substrate held by the spin chuck;

a chemical liquid control valve adapted to control a supply of the chemical liquid to the chemical liquid nozzle; and

a rinse liquid control valve adapted to control a supply of the rinse liquid to the rinse liquid nozzle; wherein the chemical liquid nozzle and the rinse liquid nozzle comprise an inner tube and an outer tube, the inner tube serving as the chemical liquid nozzle, and the outer tube surrounding the inner tube to define an annular gap, serving as a liquid passage for the rinse liquid nozzle, between the tubes.

15. (Withdrawn from Consideration) The apparatus according to claim 14, wherein a tip of the outer tube is positioned lower than a tip of the inner tube.

16. (Withdrawn from Consideration) The apparatus according to claim 14, wherein a tip portion of the inner tube is tapered toward a tip of the inner tube.

17. (Withdrawn from Consideration) The apparatus according to claim 14, further comprising a controller that controls the chemical liquid control valve and the rinse liquid control valve according to a predetermined sequence of operations, the operations including: (i) supplying the chemical liquid from the chemical liquid nozzle by operating the chemical liquid control valve, without supplying the rinse liquid; (ii) thereafter, concurrently supplying the chemical liquid and the rinse liquid from the chemical liquid nozzle and the rinse liquid nozzle, respectively, by operating at least the rinse liquid control valve; and (iii) thereafter, stopping supplying the chemical liquid nozzle while continuing supplying the rinse liquid, by operating at least the chemical liquid control valve.

18. (Currently Amended) A substrate processing method comprising:

providing a substrate having a ~~hydrophobic~~ lower layer having low wettability and ~~a hydrophilic film~~ an upper layer having high wettability arranged on the ~~hydrophobic~~ lower layer;

simultaneously supplying a chemical liquid and a rinse liquid onto the substrate, while moving a chemical-liquid supplying position on a surface of the substrate to which the chemical liquid is supplied from a periphery of the substrate toward a center of the substrate, and moving a rinse-liquid supplying position on the surface of the substrate to which the rinse liquid is supplied in such a manner that the rinse-liquid supplying position is located radially outside the chemical-liquid supplying position and follows the chemical-liquid supplying

position, a relative positional relationship between the chemical-liquid supplying position and the rinse-liquid supplying position being essentially constant, whereby an area covered with a chemical liquid film of the chemical liquid and moving toward the center of the substrate is formed on the surface of the substrate between the chemical-liquid supplying position and the rinse-liquid supplying position, and the rinse liquid is supplied onto the chemical liquid film to form an area covered with a mixed liquid film of an mixture of the chemical liquid and the rinse liquid on the substrate radially outside the rinse-liquid supplying position, so that any portion of the surface of the substrate is primarily covered with the chemical liquid film for a period of time from a point of time at which the-chemical liquid supplying position reaches the portion to a point of time at which the rinse-liquid supplying position reaches the portion, and then covered with the mixed liquid film from a point of time at which the rinse-liquid supplying position reaches the portion,

wherein the period of time is determined so that the hydrophilic film existing in the portion is partially removed by the chemical liquid to partially expose the underlying ~~hydrophobic~~ lower layer while partially remaining the ~~hydrophilic film~~ upper layer in the portion non-removed during the period of time.

19. (Currently Amended) A method according to claim 18, wherein the period of time is determined beforehand by conducting an experiment by which a time necessary for removing the ~~hydrophilic film~~ upper layer to expose the ~~hydrophobic~~ lower layer is measured.

20. (Previously Presented) A method according to claim 18, wherein the chemical liquid comprises hydrofluoric acid, and the hydrophilic film is a silicon oxide film.

21. (Previously Presented) A method according to claim 18, wherein the supplying of the chemical liquid is stopped when the chemical-liquid supplying position reaches the center of the substrate.

22. (Previously Presented) A method according to claim 21, wherein the supplying of the rinse liquid is continued after stopping supplying the chemical-liquid, and the rinse-liquid supplying position is moved to the center of the substrate.

23. (Previously Presented) A method according to claim 22, wherein a rinse-liquid supplying rate is increased after the rinse-liquid supplying position is moved to the center of the substrate.

24. (Canceled)

25. (Canceled)

26. (Canceled)

27. (Canceled)

28. (Canceled)

29. (Canceled)